United Nations A/57/346

General Assembly

Distr.: General
26 August 2002

Original: English

Fifty-seventh session
Item 60 of the provisional agenda*
Question of Antarctica

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Report of the Secretary-General**

Executive summary

The present report has been prepared by the United Nations Environment Programme (UNEP) in response to General Assembly resolution 54/45 on the question of Antarctica, in particular paragraph 4 of that resolution, in which the Assembly requested that a report be submitted to it at its fifty-seventh session on the information supplied by the Antarctic Treaty Consultative Parties on their meetings and activities in Antarctica and on developments in relation to Antarctica.

The report is based on information drawn from the final reports of the Twelfth Special Antarctic Treaty Consultative Meeting, held at The Hague from 11 to 15 September 2000, and the Twenty-fourth Antarctic Treaty Consultative Meeting, held at St. Petersburg, Russian Federation, from 9 to 20 July 2001, as well as information that the Parties made available to UNEP. It highlights the activities of the Antarctic Treaty system and international bodies, as well as recent developments pertaining to the Antarctic environment.

* A/57/150.

** The report was delayed in submission to allow its thorough revision by all relevant offices of the United Nations Environment Programme.

02-53698 (E) 250902

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Acronyms and abbreviations

AEON	Antarctic Environmental Officers Network (CONMAP)
AMD	Antarctic Master Directory
AMISOR	Amery Ice Shelf Ocean Research Programme
ANDRILL	Antarctic Geological Drilling Consortium
ANTEC	Group of Specialists on Antarctic Neotectonics
APIS	Antarctic Pack-ice Seals programme
ASOC	Antarctic and Southern Ocean Coalition
ATCM	Antarctic Treaty Consultative Meeting
BMCS	Building Monitoring Control System
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CEE	Comprehensive environmental evaluation
CEMP	CCAMLR Ecosystem Monitoring Programme
CEP	Committee for Environmental Protection
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLIC	Climate and cryosphere programme (WMO)
CMS	Convention on the Conservation of Migratory Species of Wild Animals
COMNAP	Council of Managers of National Antarctic Programmes
EPICA	European Project for Ice Coring in Antarctica
FAO	Food and Agriculture Organization of the United Nations
GCOS	Global Climate Observing System
GLOCHANT	Global Change and the Antarctic programme (SCAR)
GOSEAC	Group of Specialists on Environmental Affairs and Conservation
IAATO	International Association of Antarctica Tour Operators
ICSU	International Council of Scientific Unions
IHO	International Hydrographic Organization
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission
IOC-SOC	Intergovernmental Oceanographic Commission-Intergovernmental Committee for the Southern Ocean
ITASE	International Trans-Antarctic Scientific Expedition

IUCN	World Conservation Union
LIDAR	Light Detection and Ranging
SALE	Group of Specialists on Subglacial Antarctic Lake Exploration
SATCM	Special Antarctic Treaty Consultative Meeting
SCALOP	Standing Committee on Antarctic Logistics and Operations (COMNAP)
SCAR	Scientific Committee on Antarctic Research
SPA	Specially protected area
SSSI	Site of special scientific interest
UNEP	United Nations Environment Programme
WCRP	World Climate Research Programme (WMO)
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (IOC)

I. Introduction

1. The present report has been prepared in response to General Assembly resolution 54/45, in particular, paragraph 4 of that resolution, in which the Assembly requested that a report be submitted to it at its fifty-seventh session on the information supplied by the Antarctic Treaty Consultative Parties on their meetings, and activities in Antarctica and on developments in relation to Antarctica.

2. Information has been drawn from the reports of the Twelfth Special Antarctic Treaty Consultative Meeting (The Hague, 11 to 15 September 2000) and the Twenty-fourth Antarctic Treaty Consultative Meeting (ATCM) (St. Petersburg, Russian Federation, 9 to 20 July 2001), as well as information that the Parties made available to the United Nations Environment Programme (UNEP). The report is supported, as appropriate and necessary for its comprehensiveness, by factual information contained in documents referred to in the reports of those meetings. The report does not cover the Twenty-fifth ATCM (Warsaw, 10 to 20 September 2002) since it was prepared prior to that meeting. References have been omitted in the report to comply with rules limiting the length of General Assembly documents.

II. Activities of the Antarctic Treaty system and international bodies

A. Antarctic Treaty

3. The Antarctic Treaty was adopted on 1 December 1959 and entered into force on 23 June 1961. During the period under review, Estonia acceded to the Treaty on 24 March 1999. As at July 2001, there were 45 States parties to the Treaty, of which 27 are Consultative Parties.

4. The primary purpose of the Antarctic Treaty is to ensure, in the interests of all mankind, that Antarctica should continue forever to be used exclusively for peaceful purposes and should not become the scene or object of international discord. The Treaty provides for freedom of scientific investigation and promotes international cooperation in scientific research. It also prohibits any nuclear explosions in Antarctica and the disposal of radioactive waste material.

5. To ensure the observance of the provisions of the Treaty, Consultative Parties may carry out inspections in all areas of Antarctica. Since 1999, three inspections have been carried out. In January 2001, Norway undertook an inspection of four stations, all situated in Dronning Maud Land (Maitri (India), Novolazarevskaya (Russian Federation), SANAE IV (South Africa) and Troll (Norway)), one field station (IPICA ice core drilling station) and the site of a former station (Georg Forster (Germany)). The inspection reported that all stations were used for purposes consistent with the provisions and spirit of the Treaty. In February 2001, the United States of America carried out an inspection of 11 stations, all situated on the Antarctic Peninsula (Arctowski (Poland), Ferraz (Brazil), Vernadsky (Ukraine), Juan Carlos I (Spain), St. Kliment Ohridsky (Bulgaria), Frei and Escudero (Chile), Artigas (Uruguay), Jubany (Argentina), Great Wall (China), Bellingshaussen (Russian Federation), and King Sejong (Republic of Korea)). All inspected stations appeared to be in compliance with the provisions of the Treaty. A joint inspection was conducted by Belgium and France in eastern Antarctica in March and April 1999 of three stations (Mawson (Australia), Davis (Australia), and Casey (Australia)), one abandoned station (Wilkes (Australia)) and one vessel (*RSV Aurora Australis* (Australia)). The inspections found full compliance with the objectives and provisions of the Antarctic Treaty.

6. The three above-mentioned inspections also checked the implementation of the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol). A high degree of awareness and understanding of the Protocol was noted in most stations. Areas for improvement were identified, including fuel storage containment; material for fuel and chemical spill response; sewage treatment systems; presence of non-indigenous species; use of ozone-friendly alternatives instead of halon; familiarity with the requirements relating to environmental impact assessment; and reporting of emergency situations.

7. Every year, the Consultative Parties meet for the purpose of exchanging information, consulting on matters of common interest pertaining to Antarctica, and formulating and recommending to their Governments measures for the furtherance of the principles and objectives of the Treaty. International

organizations have also been invited to attend as experts since 1989.

8. A major breakthrough occurred at the Twenty-fourth ATCM regarding the establishment of a permanent, cost-effective secretariat to the Antarctic Treaty. A consensus was reached on the location of the secretariat in Buenos Aires. Modalities for the establishment of the secretariat will be discussed further at the Twenty-fifth ATCM, to be held in 2002.

B. Protocol on Environmental Protection

9. The Protocol on Environmental Protection to the Antarctic Treaty entered into force on 14 January 1998. During the period under review, Ukraine adhered to the Protocol. As at July 2001, there were 29 Parties to the Protocol, including all Consultative Parties and two non-Consultative Parties, Greece and Ukraine.

10. The main purpose of the Madrid Protocol is to provide for the comprehensive protection of the Antarctic environment and dependent and associated ecosystems. The Protocol designates Antarctica as a natural reserve, devoted to peace and science; prohibits mineral resource activities other than scientific research; and sets principles and measures for the planning and conduct of all activities in the Antarctic Treaty area. The Protocol comprises five annexes, dealing with environmental impact assessment (annex I), conservation of Antarctic fauna and flora (annex II), waste disposal and waste management (annex III), prevention of marine pollution (annex IV) and area protection and management (annex V).

11. Annexes I to IV formed an integral part of the Protocol. Annex V, which was adopted subsequently, requires separate ratification by all Consultative Parties to enter into force. During the period under review, Ecuador and the Russian Federation have ratified annex V. Two parties have still to ratify annex V for it to enter into force. Poland has announced that it has ratified annex V but, for technical reasons, its ratification has not yet been registered by the depositary Government. India has started the process of ratifying annex V. It is hoped that annex V will enter into force by the Twenty-fifth ATCM, in 2002.

12. For several years, States parties to the Antarctic Treaty have discussed drafts for one or more annexes to the Madrid Protocol on liability for environmental damage. No agreement has been reached (see paras. 98 and 99 below).

13. National implementation of the Protocol has been reported on at the last two Consultative Meetings by Argentina, Australia, Belgium, Bulgaria, Chile, China, Finland, Germany, India, Italy, Japan, the Netherlands, New Zealand, Norway, Peru, the Russian Federation, South Africa, Spain, Sweden, the United Kingdom of Great Britain and Northern Ireland, the United States of America and Uruguay.

14. As provided for in articles 11 and 12 of the Protocol, the Committee for Environmental Protection (CEP) has been established to, inter alia, provide advice and formulate recommendations on the implementation of the Protocol for consideration at consultative meetings. Since the entry into force of the Protocol, CEP has met once each year, in conjunction with consultative meetings.

C. Convention for the Conservation of Antarctic Seals

15. The Convention for the Conservation of Antarctic Seals entered into force on 11 March 1978. Since the Twenty-third ATCM, there have been no accessions to the Convention. As at July 2001, there were 16 States parties. The United Kingdom, as the depositary Government, reported on the numbers of the six species of Antarctic seal captured or killed in the Convention area (the sea south of 60 degrees south latitude) by States parties to the Convention during the period 1 March 1998 to 29 February 2000 (see table 2).

D. Convention on the Conservation of Antarctic Marine Living Resources

16. The Convention on the Conservation of Antarctic Marine Living Resources entered into force on 7 April 1982. Since the Twenty-third ATCM, there have been two new accessions to the Convention: Namibia (29 June 2000) and Vanuatu (20 June 2001). As at 2 July 2001, there were 31 parties.

17. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) reported on fisheries in the Convention area by States parties to the Convention for the 1999/2000 season (see table 1).

18. In order to clarify the decisions and management procedures associated with the various stages of fishery development, a simplified framework has been introduced, including a fishery plan. The fishery plan provides a comprehensive summary of information for each fishery and the associated regulatory requirements. The first two fishery plans were developed for review by the CCAMLR scientific committee.

19. In January and February 2000, a krill synoptic survey was undertaken in the south-western Atlantic (Food and Agriculture Organization of the United Nations (FAO) statistical area 48), the largest exercise ever carried out by CCAMLR member States, to improve estimates of the pre-exploitation biomass of krill. Preliminary analysis estimates the biomass at 44.29 million tons, with a potential yield of 4 million tons.

20. In the last few years, CCAMLR has played an important role in the development and implementation of measures aiming at reducing seabird mortality in longline fisheries. CCAMLR encourages its member States to participate actively in the development of a regional agreement for the conservation of albatrosses and petrels under the Convention on the Conservation of Migratory Species of Wild Animals (CMS).

21. The impact of marine debris on Antarctic animals is a point of concern for CCAMLR. Based on information collected by CCAMLR Members, there is widespread occurrence of plastic packaging bands. The loss or dumping of fishing gear is also a growing concern.

E. Scientific Committee on Antarctic Research

22. The Scientific Committee on Antarctic Research (SCAR) was established in 1958 with the purpose of initiating, promoting and coordinating scientific research in Antarctica. Its membership in 2002 is 27 full members, 6 associate members and 7 members of the International Council of Scientific Unions (ICSU).

23. There are five groups of specialists within the framework of SCAR, which meet once a year: the Group of Specialists on Environmental Affairs and Conservation; the Group of Specialists on Antarctic Neotectonics; the Group of Specialists on Global Change and the Antarctic; the Group of Specialists on Seals; and the Group of Specialists on Subglacial Antarctic Lake Exploration, which was formed in July 2000 to provide interim guidance on science issues related to the exploration of subglacial lakes, with particular reference to Lake Vostok.

24. There are also seven working groups dealing with questions of biology, geodesy and geographic information, geosciences, glaciology, human biology and medicine, physics and chemistry of the atmosphere, and solar-terrestrial and astrophysical research. At the twenty-sixth SCAR meeting, held in Tokyo in July 2000, it was agreed that the Working Groups on Geology and Solid Earth Geophysics should unite to form a new group, the Working Group on Geosciences.

F. Council of Managers of National Antarctic Programmes

25. The Council of Managers of National Antarctic Programmes (COMNAP) was established in 1988 to provide a forum to facilitate the exchange of views between directors and logistics managers of national Antarctic agencies, improve the effectiveness of operations in Antarctica, and discuss international cooperation in operations and logistics. COMNAP has a permanent Standing Committee on Antarctic Logistics and Operations (SCALOP) and various task-oriented working groups.

26. COMNAP members are increasingly supporting integrated research projects focused on global changes, and depend on technological developments to increase the efficiency and effectiveness of Antarctic science. International programmes requiring large-scale support by COMNAP include the European Programme for Ice Coring in Antarctica (EPICA), the Lake Vostok drilling project, the Concordia project and the International Trans-Antarctic Scientific Expedition. The Cape Roberts project is now completed and a new Antarctic Drilling Project consortium has been established to pursue further geological drilling research.

27. The development of intercontinental air access is continuing. In January 2001, South African and Scandinavian Antarctic programmes cooperated in a joint test flight between Cape Town and Dronning Maud Land. The Australian programme has undertaken an extensive study on the possibility of creating an air

link from Hobart to East Antarctica. Trial flights were scheduled for the 2001/02 season.

28. Since the twenty-third ATCM, there has been increased interaction between private expeditions and national programmes with respect to safety, contingency backup, and requests to national operators for search and rescue response.

29. The Antarctic Environmental Officers Network (AEON), under the umbrella of COMNAP, continues to address environmental monitoring and environmental impact assessment to provide support for individual members' activities in those areas.

30. COMNAP has worked closely with SCAR, including on the development of the Antarctic Master Directory.

G. International organizations

1. Antarctic and Southern Ocean Coalition

31. Since the twenty-third ATCM, the primary focus of the Antarctic and Southern Ocean Coalition (ASOC) has been to monitor and promote the implementation of the Madrid Protocol, with particular attention to progress in implementing the Protocol provisions, carrying out the environmental impact assessment process, the ratification of annex V to the Protocol and the development of one or more annexes on liability. ASOC has established new regional offices for Latin America, Europe and southern Africa, as well as national offices in India, the Russian Federation and Ukraine.

32. ASOC has maintained a strong interest in critical environmental issues, such as the impacts of the Antarctic tourism industry; illegal, unregulated and unreported fishing activities in the CCAMLR Convention Area; and human-induced climate changes.

2. International Association of Antarctic Tour Operators

33. The International Association of Antarctica Tour Operators (IAATO) was founded by seven private tour operators in 1991 and has grown to include 44 members from Argentina, Australia, Belgium, Canada, Chile, the Falkland Islands, Germany, Japan, the Netherlands, New Zealand, Norway, the United Kingdom and the United States. The majority of tourist ships visiting the Antarctic are IAATO members (all but four in 1999/00 and all but two in 2000/01). Some yacht operators are joining IAATO. At its twelfth general meeting, held in June 2001, IAATO revised its membership to include seven categories. The rule precluding companies with ships carrying over 400 passengers to become members has been abolished.

34. Since the twenty-third ATCM, IAATO has focused its activities on (a) increasing cooperation and field coordination among its members; (b) promoting effective environmental impact assessments; (c) preventing the introduction of alien organisms; (d) promoting self-sufficiency and proper conduct among visitors; and (e) developing emergency response and contingency plans.

3. International Hydrographic Organization

35. The permanent Working Group on Cooperation in Antarctica of the International Hydrographic Organization (IHO) has reported annually to the consultative meetings since its establishment in 1992. It is currently known as the IHO Hydrographic Committee on Antarctica.

4. Intergovernmental Oceanographic Commission

36. The Intergovernmental Oceanographic Commission (IOC) was founded in 1960 within the United Nations Educational, Scientific and Cultural Organization, and implements programmes within three subject areas: (a) marine sciences; (b) ocean services; and (c) training, education and mutual assistance and capacity-building. In 1967, IOC established the Intergovernmental Committee for the Southern Ocean (IOC-SOC) to promote and coordinate oceanographic observations and research in the Southern Ocean.

37. IOC took a lead role in establishing the Global Ocean Observing System (GOOS). GOOS aims to meet the need for (a) forecasting climate variability and change; (b) assessing the state of health of the marine environment and its resources (including the coastal zone); and (c) supporting an improved decision-making and management process which takes into account potential natural and manmade changes in the environment and their effects on human health and resources.

5. International Maritime Organization

38. The Convention establishing the International Maritime Organization (IMO) was adopted on 6 March

1948 and entered into force on 17 March 1958. The IMO Assembly met for the first time on 6 January 1959.

39. The involvement of IMO in Antarctic matters relates primarily to the prevention and control of marine pollution from ships and maritime safety. IMO is currently developing an international code of safety for ships in Arctic waters, to be known as the Arctic shipping guidelines (see also para. 73 below).

6. World Conservation Union

40. The World Conservation Union (IUCN) is a partnership of States, governmental agencies and non-governmental organizations founded in 1948. It has 973 members, including 180 State and governmental agency members. The mission of IUCN is to influence, encourage and assist societies throughout the world in conserving the integrity and diversity of nature to ensure that any use of natural resources is equitable and ecologically sustainable. IUCN has established six commissions, two of which, those on protected areas and on environmental law, have made significant contributions to the IUCN Antarctic programme.

7. United Nations Environment Programme

41. UNEP was established in 1972 to serve as a focal point for environmental action and coordination within the United Nations system. UNEP's closely linked global programmes for the marine environment and its living resources include the Global Plan of Action for the Conservation, Management and Utilization of Marine Mammals, the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities and the Regional Seas Programme.

42. The assessment programme of UNEP has responsibility for carrying out the functions concerning the state of the environment. UNEP launched the third volume of its *Global Environment Outlook* series in May 2002, in which the polar regions are dealt with in two main chapters, "State of the environment and policy retrospective 1972-2002" and "Outlook: 2002-2032".

43. UNEP administers the secretariats of various global conventions dealing with subjects relevant to Antarctica and the Southern Ocean, including the Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on Biological Diversity, the Convention on International Trade in Endangered Species of Wild Fauna and Flora and the Convention on the Conservation of Migratory Species of Wild Animals. UNEP also acts as interim secretariat for the Stockholm Convention on Persistent Organic Pollutants.

8. World Meteorological Organization

44. The World Meteorological Organization (WMO), which was established in 1950, is a specialized agency of the United Nations system. The major activity of WMO, providing the international framework for meteorological observations and data exchange, has contributed considerably to weather forecasting.

45. WMO maintains the World Weather Watch, an important feature of which is the Antarctic Basic Synoptic Network. The operation and maintenance of this Network and the timely transmission of observational data via the Global Telecommunications System are essential in providing meteorological data for global weather analysis and prediction models and research. The data is fundamental to our understanding of contemporary processes of global relevance, such as ozone depletion, atmospheric pollution, climate change, melting of ice shelves and glaciers, and sea level rise. All require Antarctic data to ensure true global perspective.

46. The World Climate Research Programme (WCRP), initiated jointly by WMO and ICSU, has a significant Antarctic component. WCRP includes research on climate and cryosphere, providing a globally integrated approach to the study of the role of the cryosphere in the climate system.

47. WMO continues to cooperate with ATCM, SCAR, COMNAP and IOC. Closer cooperation with IOC will also cover the IOC World Ocean Circulation Experiment (WOCE), which has been expanded to include atmosphere-ice-ocean interactions in the southern latitudes. With co-sponsors the British Antarctic Survey, the Australian Bureau of Meteorology, SCAR and COMNAP and contributions from 15 nations, an international Antarctic weather forecasting handbook was produced to primarily guide/inform people involved in operational weather forecasting in the Antarctic.

48. In June 2001, the WMO Executive Council, requested its Working Group on Antarctic Meteorology to strengthen cooperation on Antarctic matters with

other WMO programmes. The Council also called upon its members to deploy more automatic weather stations on the continent and drifting buoys in the seasonal sea ice zone, and to expand ozone related measurements to meet growing environmental needs.

III. Recent developments pertaining to the Antarctic environment

A. Science and support activities

1. Science support sites

49. Australia has installed a building monitoring control system in all its stations to optimize the operation of pumps, lights, heating and ventilation systems and minimize energy use. Australia is also planning the installation of wind turbines, which would lead to at least a 75 per cent reduction of fossil fuel use and reduce the risk of oil spills.

50. A new base, Kohnen (Germany), has been established in Dronning Maud Land. The base that became fully operational on 11 January 2001 is part of EPICA.

2. Weather and global change

51. There are a number of meteorological reporting networks supporting Antarctic operations and research, including automated and staffed surface weather stations, stations providing upper-air soundings and satellites providing information. Forty-four surface weather stations are staffed. As a result of economic considerations, the coverage of the upper-air network is gradually being reduced to 12 stations (with only the Amundsen-Scott station in the interior). There are 18 Antarctic surface weather stations included in the 989 stations of the GCOS Surface Network. The 12 Antarctic upper-air stations are included in the 150 stations that make up the GCOS Upper Air Network. A network of ground stations located in the Antarctic complements the satellite-borne instruments that monitor the losses of ozone in the stratospheric ozone layer.

52. With a view to standardizing the collection of meteorological data, the Russian Federation has introduced new data-collection methods in all its stations.

53. Australia installed a light detection and ranging instrument at Davis station in 2000/01, designed to remotely measure temperature, wind velocity and aerosol concentration from the lower atmosphere (10 kilometres (km)) to the upper mesosphere (about 90 km altitude) to look for evidence of climate change in the polar atmosphere.

3. Data and metadata

54. The Antarctic Master Directory provides information on the types of Antarctic data in each country and how the data can be accessed. Information is contributed by national Antarctic data centres. Due to limited acceptance of the Directory, funding for its development was suspended in 2000. New funds were secured for 2001 and 2002 in support of specific outputs.

4. Global change

55. Under its programme "Studies and research in the Antarctic", the Russian Federation has studied the impact of climate change in Antarctica. Quantitative estimates of the Antarctic climate changes due to a doubling of carbon dioxide (CO_2) concentration were obtained based on a climate model: increase of surface temperature by 3.9 degrees (°) Celsius, on average, in winter, and 2.8° in summer; increase in precipitation by 50 millimetres (mm) a year; and displacement of cyclone trajectories southward. Calculations show that the accumulation will increase the mass of Antarctic glaciation.

56. Based on studies of the ice core of Vostok station, sub-glacial Lake Vostok and the dynamics of glaciers in the marginal zone of the Antarctic, air temperature changes in the vicinity of Vostok station have been reconstructed for the last 400,000 years. The temperature oscillations relative to the current state were within +5° to −15° Celsius. The snow accumulation (expressed in mm of water) changed from 12 mm at the cooling maximums to 36 mm at the warming maximums. Glacier degradation in the Antarctic Peninsula was noted during the past decade.

5. Earth sciences and glaciology

57. The Cape Roberts project, established to investigate the history of uplift of the Trans-Antarctic Mountains and the past 100 million years of climate history, has been completed.

58. Collaborative research is continuing under the European Project for Ice Coring in Antarctica.

59. An ice drilling project on the north-eastern corner of the Amery ice shelf near Davis station was undertaken during the 2000/01 summer. The borehole facilitated the provision of data on the history of the retreat and advance of the shelf across the site.

60. Twenty-four Australian and Italian scientific personnel, from 13 institutions, undertook an international ocean drilling programme in February and March 2000 in the waters off the East Antarctic coast of Wilkes Land. The results from the programme will help to better understand the dynamics of the Southern Ocean and how they affect the region's ecosystems and climate.

61. Lake Vostok is generating increasing scientific interest. No coring of the Lake has yet taken place, with drilling stopping approximately 100 metres (m) above the Lake. Ice overlying the Lake is 3,700 to 4,000 m thick and the water layer is 670 to 800 m thick. The project will be subjected to a comprehensive environmental evaluation before drilling is attempted. SCAR convened the International Workshop on Subglacial Lake Exploration in Cambridge, United Kingdom, in September 1999. The workshop produced a scientific plan and made suggestions for a phased-in approach for comprehensive subglacial lake exploration programme. It also recommended the appointment of an international group of specialists on subglacial Antarctic lakes exploration.

62. Canada is coordinating the development of a cyber-cartographic atlas of Antarctica, a computer-based atlas that will allow assembly and display of environmental information in multiple dimensions. National mapping offices and academic institutions from several countries have participated in the planning and provided data. Discussions have continued with members of the SCAR Working Group on Geodesy and Geographic Information.

6. Life sciences

63. As part of the international Antarctic Pack Ice Seals programme, a detailed ship-based and aerial survey across the Southern Ocean in the outer Antarctic pack ice took place during the 1999/00 season. The team surveyed an area of more than one million square kilometres (km^2) and captured seals and attached dive recorders to study their movements and diving behaviour.

B. Environmental monitoring and state of the environment report

1. Environmental monitoring

64. COMNAP/SCAR have published an environmental monitoring handbook and CD-ROM. The handbook provides techniques for physical and chemical monitoring of station environmental impacts. COMNAP's Antarctic Environment Officers' Network is developing guidelines for station environmental monitoring programmes.

65. CCAMLR's Ecosystem Monitoring Programme (CEMP) monitors the status of selected species at various localities and in various habitats around the Antarctic south of the polar front. It records population changes in those species in relation to biological and environmental variability. As such, CEMP data give an indication of the ecosystem health.

66. Specific monitoring programmes are being implemented by various nations. Peru is continuing its studies on environmental radioactivity and biomonitoring. The Russian Federation has carried out monitoring of the radiation conditions and chemical environmental parameters in the areas of Russian Antarctic stations during the 1999/2000 season, in view of the large quantity of artificial radionuclides that have been generated for the last three decades on Earth and could be deposited in Antarctic areas.

2. State of the Antarctic environment report

67. The preliminary study for a State of the Antarctic environment report to be prepared by SCAR will be submitted to the fifth meeting of the Committee for Environmental Protection.

68. New Zealand announced that a Ross Sea region state of the environment report will be completed by November 2001 and may be used as a pilot for a continent-wide report, although the timing of a state of the Antarctic environment report will not be tied to its completion.

C. Environmental impact assessment

69. In accordance with the Madrid Protocol, environmental impact assessment procedures have been developed for activities undertaken in the Antarctic. Where the impact will be less than minor or transitory, an initial environmental evaluation is to be prepared. If the impact is likely to be more than minor or transitory, a comprehensive environmental evaluation must be carried out.

70. COMNAP is conducting an analysis of initial evaluations prepared for scientific ice core drilling, station living facilities and fuel storage with the aim of achieving a better understanding of how the environmental impact assessment process is being implemented by different operators. SCAR was planning a workshop in 2001 to consider the potential impacts on the marine environment of scientific acoustic techniques.

71. Some discussions were held on the merits of strategic environmental assessment. The issue of cumulative environmental impact received increased attention. An intersessional contact group was formed at the twenty-fourth ATCM to: (a) present an annotated summary of past and continuing studies and reports that are examining cumulative environmental impacts pertinent to the Protocol; (b) consider and advise on how future studies on human impacts could be coordinated and conducted, including the roles that SCAR, COMNAP, CCAMLR and IAATO, ASOC and other non-governmental organizations might play in this work; and (c) identify priorities for future studies on the cumulative environmental impacts of human activity in Antarctica.

72. Since the twenty-third ATCM, one comprehensive evaluation has been submitted to the Committee for Environmental Protection by Germany regarding the recovering of a deep ice core in Dronning Maud Land. The evaluation was in accordance with the Madrid Protocol.

D. Safety of operations, emergency response and contingency planning

73. In response to decision 2 (1999) of the twenty-third ATCM, an Antarctic Treaty meeting of experts was convened in April 2000 to begin the development of Guidelines for Antarctic shipping and related activities. The guidelines may draw on the Arctic shipping guidelines currently being developed under the auspices of IMO, in particular with regard to vessel construction and equipment. A zonation of the Southern Ocean based on ice navigation conditions is being developed and could be part of the guidelines.

74. COMNAP undertook a study of environmental emergencies arising from activities in Antarctica. Fuel spills are the most common incidents, with the greatest potential to cause environmental impacts. Most reported spills have been small and confined to a station or base or adjoining waters. Further fuel spills in the marine environment are the least likely to occur but pose the greatest risk to wildlife. IAATO carried the same survey among its members. Since 1991, 11 incidents have occurred: six transport incidents, one oil leakage, three medical evacuations and one environmental incident (a collision with a humpback whale).

E. Waste disposal and waste management

75. Annex III to the Madrid Protocol provides guidelines for waste disposal and waste management by Parties.

76. The Russian Federation has implemented a number of preventive measures with regard to waste disposal and management and has carried out clean-up actions in its stations. Uruguay removed waste of unknown origin in the vicinity of its ECARE station. Chile adopted new environmental practices to be applied to the installation of a portable summer station in Patriot Hills.

77. The inspection carried out by the United States indicated that some stations did not have adequate sewage treatment systems. The inspection undertaken jointly by Belgium and France noted waste-related problems at the abandoned Wilkes station.

F. Prevention of marine pollution

78. Annex IV to the Madrid Protocol covers marine pollution. It regulates the discharge of sewage, oil or oily liquids or other noxious liquids, disposal of garbage, preventive measures and emergency preparedness.

79. Recently, IHO and many of its Member States have taken an increased interest in Antarctica, because of the growing volume of vessel traffic and the consequent increase of risk of pollution. IHO embarked on a special programme to improve the quality of charts of the Antarctic coast. The status of surveying and charting is slowly improving.

80. The United Kingdom and Germany undertook a successful oil spill exercise at the Rothera Research Station in conjunction with the research vessel *Polarstern*. An accident involving the Chilean vessel *Patriarche* was reported.

81. There is an increased amount of marine debris in the Southern Ocean. CCAMLR members are currently collecting information regarding loss or dumping of fishing gear; collection of marine debris by vessels at sea; surveys of marine debris on beaches; entanglement of marine mammals in marine debris; marine debris associated with seabird colonies; and animals externally contaminated (i.e., soiled) by hydrocarbons or other substances. Plastic packaging bands still persist in marine debris washed ashore in FAO statistical sub-areas 48.2 and 48.3, although their uses are prohibited in the Convention Area. There is also growing concern over the potential impact of fishing gear lost from vessels, which may have an impact both on fish stocks (ghost fishing) and on seabird and marine mammal populations (entanglement, ingestion). This problem is likely to be more acute in unregulated fisheries where longlines are sometimes abandoned by vessels trying to avoid detection.

G. Ozone depletion

82. The Antarctic springtime ozone hole is one of the most dramatic manifestations of global change; in 2000, it reached a record area of almost 30 million km^2 in the first week of September, compared with areas of between 24 and 27 million km^2 in the previous five springs. The year 2000 ozone hole departed from previous years in the rapid appearance and early decline in the size of the hole. By 23 November 2000, the hole had dissipated entirely, the earliest it has done so since 1991. This is related to the natural variability of general circulation patterns in the global atmosphere, but particularly to variations within the circum-polar vortex in the lower stratosphere over Antarctica.

83. Changes in ozone over Antarctica are predicted to be accompanied by an increase of 130 per cent in surface erythemal (skin damaging) radiation if other influences, such as clouds, remain constant. However, worldwide compliance with current international agreements is rapidly reducing the yearly emissions of ozone-depleting substances. As those emissions cease, the ozone layer will gradually improve over the next several decades.

H. Conservation of Antarctic fauna and flora

84. Annex II to the Madrid Protocol covers the conservation of Antarctic fauna and flora, including their protection, introduction of non-native species or diseases, exchange of information and specially protected species.

85. The intersessional working group set up at the Twenty-third ATCM has completed its study on diseases of Antarctic wildlife. The study reviewed historic information on wildlife diseases in Antarctica; characteristics of the Antarctic environment that increase the risk of disease introduction; human activities and their potentials to introduce disease; and scenarios that increase risk. The study identified practical measures to diminish such risk. Currently, the risk that human activities in Antarctica might introduce diseases is assessed to be very low.

86. A review of the conservation status of Antarctic fauna and flora was initiated. The review aims to identify species which might be designated as Antarctic specially protected species; recommend legal and practical mechanisms to provide special protection for those species; and consider whether the status of specially protected species should be applicable to Antarctic species other than native mammals, birds and plants.

87. An ongoing review of guidelines for the operation of aircraft near concentrations of birds is being undertaken. Interim results of the review were presented at the Twenty-fourth ATCM.

88. The mortality of seabirds resulting from illegal, unregulated and unreported fishing in the CCAMLR Convention Area still remains a problem. A concerted international effort is required to resolve this problem. CCAMLR has played an important role in the creation and implementation of measures to reduce seabird

mortality in longline fisheries. Those measures, coupled with the willingness of many fishing masters to cooperate with scientific observers, helped to alleviate the problem within the regulated fishery in the Convention Area, especially in FAO statistical sub-areas 48.3 (South Georgia) and 88.1 (Ross Sea). However, concern has been expressed that greater fishing effort and poorer compliance during the 1999/2000 fishing season has led to increased seabird by-catch in sub-areas 58.6 (Prince Edward and Marion Islands) and 58.7 (Crozet Islands).

89. The reported fisheries catches are given in table 1. As noted in the table and previous reports, reported catches of krill have remained relatively stable since 1992/93, ranging from 80,000 to 120,000 tons, while reported catches of finfish have increased significantly. There was no fishing for squid or crabs in the Convention Area during 1999/2000.

Table 1
Reported fisheries catches, Antarctica, 1998/99 and 1999/2000
(*Tons*)

	Year	
	1998/1999	*1999/2000*
Krill	103 318	101 286
Finfish	18 094[a]	19 283[b]

[a] Patagonian toothfish (*Dissostichus eleginoides*) accounted for 17,558 tons.
[b] Patagonian toothfish accounted for 14,441 tons; it is believed that, in addition to reported catches, about 6,000 tons were taken as a result of illegal, unregulated or unreported fishing activities.

90. Illegal, unregulated and unreported fishing of toothfish remained one of the major issues faced by CCAMLR, which has introduced an integrated set of administrative and political measures to address such activities, including the establishment of cooperative mechanisms between Parties, such as the catch documentation scheme; inspections by Contracting Parties of all their vessels licensed to fish in the Convention Area; inspections of non-Contracting Party fishing vessels in the ports of Contracting Parties; compulsory identification markings on vessels and fishing gear; further development of ties with non-Contracting Parties; and the introduction of a vessel monitoring system in toothfish fisheries. The catch documentation scheme is the most important measure taken by CCMALR. The scheme is designed to track the landings and trade flows of toothfish caught in the Convention Area and, whenever possible, in adjacent water. The scheme became binding upon all CCAMLR members on 7 May 2000. Several non-Contracting Parties engaged in toothfish fishing and/or trading were invited to cooperate with the scheme. Seychelles and Mauritius have already taken steps to that end. Recommendation 2 (2000) adopted at the Twelfth Special ATCM also requested non-Contracting Parties to CCAMLR involved in toothfish fishing or trading to comply voluntarily with the scheme.

91. In June 2002, the CITES secretariat published proposals submitted by a Party to list two species of toothfish (*Dissostichus eleginoides* and *Dissotichus dawsonii*) in appendix II to the Convention; they will be considered at the twelfth meeting of the Conference of the Parties to the Convention, to be held in Santiago from 3 to 15 November 2002.

92. The reported capture and killing of seals in 1998/99 and 1999/2000 has increased significantly (see table 2). Four countries are still not reporting seal captures or kills. At its seventh Conference of Parties to the Convention, CMS will consider a proposal from a Party to list the South American fur seal in appendix II to the Convention.

Table 2
Reported capture and killing of seals, 1998/99 and 1999/2000

	Year	
	1998/1999	*1999/2000*
Captured and released	560[a]	5 378[b]
Killed	0	1[c]

[a] By Chile (520) and Brazil (40).
[b] By United States (4,696), Chile (564), Japan (98) and Brazil (20).
[c] By United States.

I. Area protection and management

93. Annex V to the Madrid Protocol covers area protection and management. When it enters into force,

all existing sites of special scientific interest and specially protected areas will become Antarctic specially protected areas. In addition, management plans will be required where none have previously been adopted. Guidelines have been adopted for the identification of such areas. Work on a systematic environmental geographic framework has also been initiated, facilitating systematic risk assessments in relation to proposed protected areas and overall protected area planning.

94. There have been two new and seven revised management plans approved since the Twenty-third ATCM. The date of expiry of 22 sites of special scientific interest were extended until 31 December 2005. It has been agreed that draft management plans are to be reviewed by an intersessional contact group. A number of such plans are currently in the review process.

95. Two resolutions were adopted regarding historic sites and monuments. By resolution 4 (2001), parties were asked to review and update the list of historic sites and monuments. Resolution 5 (2001) recommended the use of new guidelines on the handling of pre-1958 historic remains for which the existence or current location have not been established.

96. Of concern is the unrestricted collection of meteorites in Antarctica. Resolution 3 (2001) was adopted urging parties to the Madrid Protocol to take all necessary legal or administrative steps to preserve Antarctic meteorites so that they are collected and curated according to accepted scientific standards, and made available for scientific purposes.

J. Sea ice and ice sheets

97. The large permanent polynya (an area of open water within the sea ice) off the Mertz Glacier in George V Land was studied in July-August 1999. The process of ice formation in the polynya is very rapid, a rate of ice production that is sufficient to produce surface water that is more salty and denser than normal seawater and sinks down over the edge of the continental shelf and into the ocean depths. That vertical circulation of water, "Adélie bottom water", could be of major significance in driving oceanic circulation for many thousands of kilometres out into the Pacific and Indian oceans. Previously, it was thought that the Weddell Sea, close to the southern tip of South America, was the major source of dense Antarctic bottom water.

K. Question of liability

98. In accordance with article 16 of the Madrid Protocol, the Consultative Parties undertake to elaborate rules and procedures relating to liability for damage arising from activities covered by the Protocol, to be included in one or more annexes. To date, no such annexes have been developed.

99. Two main approaches have been put forward: a step-by-step approach promoted by one Party and a comprehensive approach. Although there is no consensus on either approach, some work has been carried out on a step-by-step approach. Meanwhile, clarifications have been brought on issues or terminology related to liability, including environmental emergencies; unplanned and accidental events; response actions; preventive measures; contingency plans; operators; dependent and associated ecosystems; limits of compensation; environmental funds; and dispute resolution. In response to resolution 5 (1999), SCAR and COMNAP have also considered a number of liability-related definitions/issues from a scientific point of view, including harm to the environment; dependent and associated ecosystems; activities/incidents that might result in harm to the environment; containment, mitigation and clean-up action; and irreparable harm.

L. Antarctic tourism and other non-governmental operations

100. From 1992/1993 to 2000/2001, there has been a significant increase (82 per cent) in the number of shipborne tourists (see table 3). The 1999-2000 season recorded the highest number of shipborne tourists ever, 14,402. The main factor for yearly fluctuation in the scale of shipborne tourism is the presence of large tour ships.

101. The majority of Antarctic seaborne voyages are to the Antarctic Peninsula region: only five of 153 departures during 1999/2000 and six of 135 voyages during 2000/01 took place outside that region.

Table 3
Selected tourism statistics, Antarctica, 1992-2000

	Year								
	1992/93	*1993/94*	*1994/95*	*1995/96*	*1996/97*	*1997/98*	*1998/99*	*1999/2000*	*2000/01*
Number of shipborne tourists	6 585	8 016	8 098	9 212	7 322	9 378	9 857	14 402	11 997
Number of tourist vessels (number of Russian vessels)					13 (9)	14 (6)	15 (7)	20 (10)	18 (9)
Number of Yacht cruises (number of tourists)	18	19	19	13	24	11 (95)	11 (90)	23 (221)	14 (128)
Number of land-based tourists					106	131	79	139	127
Sightseeing flights					10	9	9	31	25

102. Land-based tourism is operated by IAATO member Adventure Network International. There are now usually over 100 land-based tourists per season.

103. Antarctic tourism activities are increasing, as well as their diversity, presenting new management challenges. The practical management of adventure tourism and its potential impact on national programmes and tour operators in terms of search and rescue operations for unsupported adventure tourists is a growing concern. The Twenty-fourth ATCM decided that the issue of tourism should be the subject of detailed discussion at its next meeting, in 2002.

104. All IAATO members except one have completed their environmental impact assessments for 1999/2000

and 2000/01. A new standard protocol to report any high mortality incidents among Antarctic wildlife and to avoid the introduction and translocation of alien diseases is being used by IAATO members. An industry-wide emergency response action and contingency plan has been prepared. Specifications for IAATO member tour vessels have also been compiled to contribute to a risk assessment.

105. Antarctic tour operators have continued to support operations and programmes in the Antarctic by providing transport.

M. The Arctic and Antarctica

106. The Arctic Council was inaugurated in 1996 and provides for cooperation, coordination and integration among the eight Arctic States. The Council includes Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden and the United States. The major indigenous organizations in the Arctic are also permanent participants in the work of the Council. There is a systematic exchange of information between the Antarctic Treaty system and the Arctic Council.

107. The legal situations in the Arctic and Antarctica are quite different, although a number of scientific and environmental issues are common to both regions. Some of the work conducted in the Arctic could serve as an example in Antarctica, such as the studies entitled "Arctic flora and fauna: status and conservation" and the "Arctic climate impact assessment", as well as the International Bathymetric Chart of the Arctic Ocean and the Marine Arctic Sediment Thickness project.

IV. Concluding remarks

108. **The Antarctic Treaty system continues to provide a unique example of international cooperation. Designated as a natural reserve, devoted to peace and science, Antarctica is the scene of successful international cooperation in research, in particular for the study of global changes.**

109. The entry into force of the Madrid Protocol on 14 January 1998 has further regulated human activities in Antarctica to protect the Antarctic environment and its dependent and associated ecosystems. The Committee for Environmental Protection has become a dynamic forum to discuss and address environmental issues related to human activities. The recent consensus on the establishment of an Antarctic Treaty secretariat will provide the Treaty with a central repository of information, in particular with regard to its meetings and activities.

110. There are, however, some issues of concern and challenges that need to be addressed. Since 1991, no agreement has been reached on one or more annexes to the Madrid Protocol concerning liability for environmental damage, although much work has been done to build a consensus on the way forward. Major efforts have been undertaken to address illegal, unregulated and unreported fishing for toothfish in the Southern Ocean, but further enforcement and cooperation are still required from all States involved to bring such activities to a halt. The number of tourists and tour vessels continues to increase: efforts should continue to prevent and mitigate the environmental impact of that growing industry. Global changes, in particular climate change and depletion of the ozone layer, remain major threats to the integrity of the Antarctic environment.